

Shri P. C. Roy who has helped in the preparation of figures.

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**A New Species of *Pyrrosia* from India**

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During a fern collecting tour of northeastern India, organized by the National Botanic Gardens (Lucknow) in May and June, 1961, I collected a narrow-leaved species of *Pyrrosia* in Manipur. The specimen did not tally with any of the species described previously. It was sent to Professor R. C. Ching (Peking Academy of Science), who confirmed that it is new, and suggested the name *Pyrrosia nayariana*, in honor of Dr. B. K. Nayar in recognition of his contributions towards a better understanding of the phylogeny of ferns, especially of the Indian species of *Pyrrosia*.

*PYRROSIA nayariana* Ching et Chandra, *sp. nov.*

Rhizoma breviter repens 2-3 mm. crassum, radicibus fascicu-  
 latis nigris firmis, dense paleatum, paleis peltatis lanceolatis 2-3  
 mm. longis dentatis; folia conferta lineari-oblongata 15-20 cm.  
 longa, vix. 1.0 cm. lata, sessilia vel subsessilia, apice acuta, basi  
 gradatim attenuata, supra glabra, hydathodis punctatis in apice  
 venulis ultimis liberis, subtus dense tomentosa, pilis stellatis tri-  
 formibus, inferioribus densis ramis elongatis gracilibus glomer-  
 atis, superioribus floccosis ramis brevibus latis cymbiformibus,  
 alteris ramis gracilibus acicularibus; folia fertilia saepe paullo



angustiora quam sterilia, soris subtus ubique praedita, soris in 2 vel 4 lineis costae utrinque latere; sporangii annulus ex 16–20 cellulis compositus; sporae monoletae, extine verrucoso.

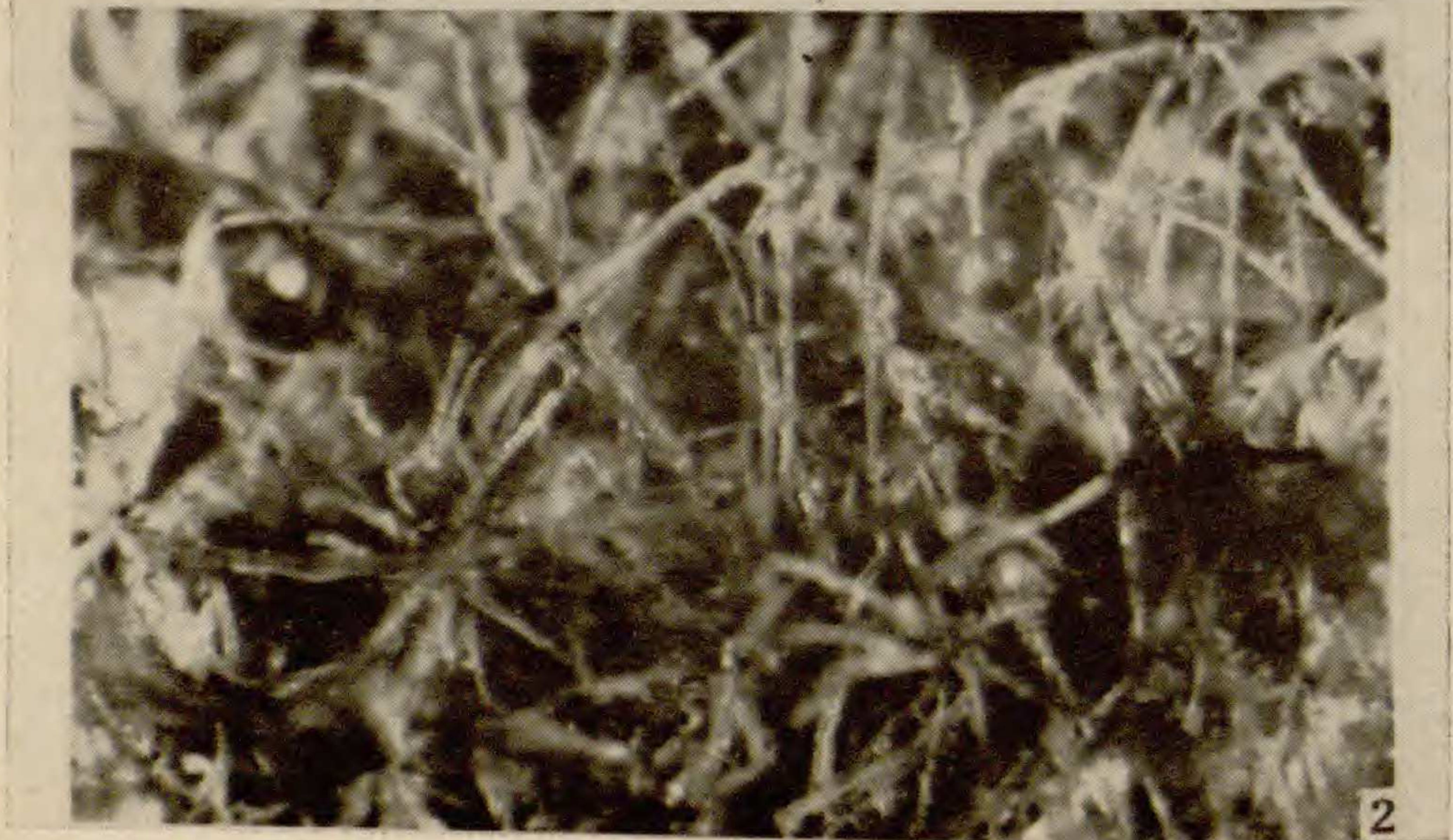
Type in the herbarium of the National Botanic Gardens, Lucknow, India, sheet No. 47,967, collected at Imphal, Manipur, India, at about 795 meters elevation, May 12, 1961, by P. Chandra (no. 74310). Isotype in the Botanical Institute, Academia Sinica, Peking, China.

*Pyrrrosia nayariana* (Fig. 1) grows in small epiphytic clumps on trunks and branches of trees in the plains. The fleshy rhizome is 2–3 mm. in diameter, short, branched, and enveloped by much-branched clusters of fibrous roots which form spongy masses attached to the substratum. The paleae (Fig. 3) are elongate-lanceolate, densely covering the rhizome, light brown in color, and peltate with an ovate basal region and a short, cylindrical stalk. The apex of the palea is acuminate and crowned by a simple or branched, deciduous glandular hair; the margin is dentate. The development of the palea is as described earlier (Chandra, 1962; Nayar, 1961). Structurally, the rhizome is similar to that of *P. flocculosa* and *P. mollis* (*P. fissa*), but slender sclerenchyma strands, up to 16 cells thick, are irregularly distributed in the pith and inner cortex (Fig. 4). These strands are composed of very thick-walled, dark brown cells, with occluded lumen and prominent pit-connections in the walls. The cortical sclerenchyma sheath is 4–6 cells thick and golden brown in color. The vascular cylinder of the rhizome (Fig. 5) is a loose reticulum composed of many cylindrical vascular bundles, as in other species of *Pyrrrosia* (Nayar, 1961). Leaf-traces to successive leaves originate alternately on either side of the dorsal, median vascular bundle. Branching of the vascular bundles and the fusion of nearby branches is very common. Three slender branches, originating from the dorsal median vascular bundle and a bundle lateral to it, supply each leaf (Fig. 5 1). The first-formed branch (usually from the median vascular bundle of the rhizome) forks once and forms the pair of abaxial bundles of the stipe. Compli-





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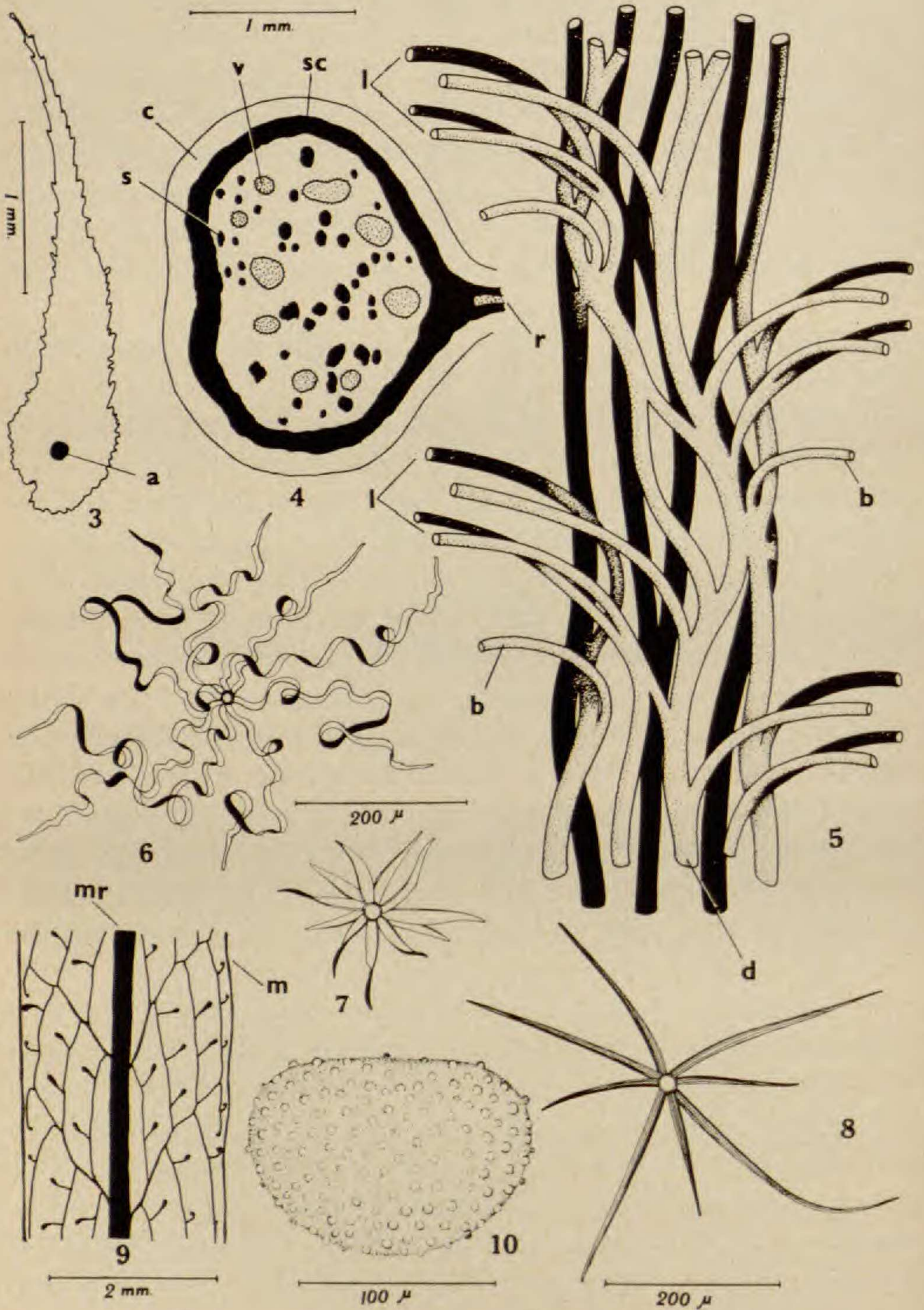
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cated vascular anastomoses occur before the separation of the leaf traces. Branches of the rhizome are associated with the leaves, and many are dormant. Each branch is supplied by a solitary vascular trace (Fig. 5 b), which originates along with the vascular connections to the leaf, as in *P. flocculosa* (Nayar, 1961). The leaves are articulated to short phyllopodia, the articulation being composed of a saucer-shaped pad of small parenchyma cells, as in *Drymoglossum* (Nayar, 1957). Peltate paleae cover the phyllopodium but paleae are absent on the leaf. The leaves are crowded, sessile, and linear-oblongate (Fig. 1). The lamina is thick, leathery, glabrous on the upper surface, and densely covered by stellate hairs beneath (Fig. 2). A dense felt is formed by nearly hyaline, thin hairs with very long, more or less thin-walled, coiled, slender, frizzly arms (Fig. 6), which are entangled to form the dense felt. Above this layer are two types of hairs intermingled; one with short, broad, dark brown, boat-like, crowded arms (Fig. 7) and the other of a lighter color and bearing few, long, slender, needle-like arms (Fig. 8). Prominent, pitlike depressions representing foliar hydathodes occur on the upper surface. The venation of the lamina (Fig. 9) is fundamentally similar to that of many species of *Pyrrosia* described by Nayar (1961). The midrib is prominent, and bears alternately placed, loosely arranged, immersed, lateral veins. The latter are at an angle of 30–40° with the midrib and are connected by three (or four) secondary branches at right angles to them, resulting in a row of elongated, rhomboidal areoles. The secondary veins bear two or three, free-ending, short, tertiary branches on the side facing away from the midrib. Most of these tertiary branches subtend hydathodes on the upper surface of the lamina. Each stoma is encircled by a single epidermal cell. The fertile leaves are similar to the sterile ones in structure and venation. The sori are punctiform and distributed over all of the under side of

FIGURE 1. *PYRROSIA NAYARIANA* CHING & CHANDRA. FIGURE 2. STELLATE HAIRS ON UNDER SURFACE OF LEAF.







the leaf, directly above the apices of the tertiary veinlets. The sporangia are long-stalked. The annulus is 16–20 cells long. The spores (Fig. 10) are monolete (bilateral), plano-convex in equatorial view, ovate in polar view, and  $61 \times 86 \times 62 \mu$  ( $P \times E_1 \times E_2$ ). The laesura is thickened. The exine is golden brown and densely verrucose, the protuberances being small and more or less uniformly distributed.

*Pyrrrosia nayariana* resembles small-leaved specimens of *P. mollis* (*P. fissa*). In the latter the annulus of the sporangium is 20–24 cells long and the spores are more rounded ( $54 \times 86 \times 54 \mu$ ) and smooth-walled, whereas the annulus is 16–20 cells long in *P. nayariana* and the spores are verrucose and conspicuously larger.

I am grateful to Professor K. N. Kaul, Director, National Botanic Gardens, for his keen interest in this work, and to Dr. B. K. Nayar under whose guidance this work was done. Thanks are due to Dr. R. C. Ching for kindly confirming the identification and suggesting the specific name, and to C. V. Morton for the Latin diagnosis.

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FIGURES 3—10. STRUCTURAL DETAILS: 3. PALEA; 4. TRANSVERSE SECTION OF RHIZOME, SHOWING SCLERENCHYMA AND VASCULAR BUNDLES; 5. VASCULAR STRUCTURE OF A PORTION OF THE RHIZOME (ROOTS OMITTED); 6—8. FOLIAR HAIRS; 9. VENATION PATTERN; 10. SPORE, EQUATORIAL VIEW. (A = STALK OF PALEA; B = BRANCH TRACE; C = OUTER CORTEX; D = DORSAL MEDIAN VASCULAR BUNDLE; L = VASCULAR CONNECTION TO LEAF; M = LEAF MARGIN; MR = MIDRIB; R = ROOT; S = SCLERENCHYMA STRANDS; SC = CORTICAL SCLERENCHYMA SHEATH; V = VASCULAR BUNDLE).